WHAT IS CLAIMED IS:

1. A system for a performing a remote measurement of the displacement between two adjacent objects, comprising:

a pair of sensors, each sensor having a magnetic rod and a sensor coil;

wherein each sensor is operable to form a tuned circuit, and wherein the sensors have substantially the same resonant frequency;

an interrogator having a transmit coil and at least one receive coil, transmit circuitry for delivering to the sensor coils an excitation signal through a range of frequencies, and receive circuitry for receiving a response signal from the sensor coils;

wherein the interrogator is operable to detect a pair of peak frequencies from the sensors when the sensors are placed substantially parallel to each other in an environment where displacement is to be measured.

2. The system of Claim 1, further comprising means for electrically resonating the each coil.

3. The system of Claim 1, wherein each rod has at least one end mount operable to be attached to one of the objects.

4. The system of Claim 1, wherein the transmit coil and the at least one receive coil are configured in a nulling geometry.

5. The system of Claim 4, wherein the nulling geometry has one receive coil and one transmit coil.

6. The system of Claim 4, wherein the nulling geometry has two receive coils and one transmit coil.

7. The system of Claim 1, wherein each sensor is encased in a flexible sheath.

8. The system of Claim 1, wherein the sensors are coated with a biocompatible material.

9. The system of Claim 1, wherein the sensors are made from biocompatible materials.

10. The system of Claim 1, wherein the interrogator further has mixer circuitry for mixing the transmitted signal and the received signal.

11. The system of Claim 1, wherein the interrogator has digital processing circuitry for processing the received signal.

12. The system of Claim 1, wherein the interrogator has a mutual inductance bridge electrically connected to at least one coil.

13. The system of Claim 1, further comprising means for adjusting the resonance of the sensor.

14. A method for determining displacement between two objects, comprising the steps of:

attaching a first sensor to a first location;

attaching a second sensor to a second location, such that the second sensor is substantially parallel to the first sensor;

wherein each sensor has a rod, a coil, and a capacitor, electrically connected such that the rod, the sensor coil, and the capacitor form a tuned circuit;

interrogating the sensors with an interrogation signal; and

receiving a response signal from the sensors, said response signal having a pair of peak frequencies that indicate the motion of the sensors relative to each other.

15. The method of Claim 14, wherein the sensors are attached by being embedded.

16. The method of Claim 14, wherein each sensor is attached by means of an end mount at one end of each sensor.

17. The method of Claim 14, wherein the receiving step is performed with at least one receive coil and at least one transmit coil configured in a nulling geometry.

18. The method of Claim 17, wherein the nulling geometry has one transmit coil and one receive coil.

19. The method of Claim 17, wherein the nulling geometry has two receive coils and one transmit coil.

20. The method of Claim 14, further comprising the step of encasing each sensor in a protective sheath.

21. The method of Claim 14, further comprising the step of creating an electrical resonance of each sensor, such that the response signal has a pair of resonant frequencies.

22. The method of Claim 14, wherein each sensor is self resonating in response to the interrogation step.

23. A method for determining displacement between two objects within a living body, comprising the steps of:

attaching a first sensor to a first skeletal object;

attaching a second sensor to a second skeletal object, such that the second sensor is substantially parallel to the first sensor;

wherein each sensor has a rod, a coil, and a capacitor, electrically connected such that the rod, the sensor coil, and the capacitor form a tuned circuit;

interrogating the sensors with an interrogation signal; and

receiving a response signal from the sensors, said response signal having a pair of peak frequencies that indicate the motion of the sensors relative to each other

24. The method of Claim 23, wherein the skeletal objects are portions of the spine.